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Consulting Engineers Ltd

Flood Risk Appraisal

Proposed Ivory Building Extension @

CGP, Mainsgate Road, Millom, Cumbria.

on Behalf of
CGP Publications Ltd

Document Reference	**CN 20198**
Version	**V1**
Date Released	**8th October 2020**
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1. Introduction

1.1 Background

M & P Gadsden Consulting Engineers have been appointed by CGP Publications Ltd to undertake a Flood Risk Assessment in support of a planning application to erect a three story extension to the existing Ivory Building at CGP, Mainsgate Road, Millom.

The purpose of this report is to comment upon the flood risk status of the area with a view to construct a proposed new dwelling and the likelihood of increased flood risk to the development land or the surrounding area.

1.2 Planning Policy Context

Current planning policy for flood risk and surface water management is dictated by the National Planning Policy Framework (NPPF). This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements of the NPPF.

The NPPF states "A Site Specific Flood Risk Assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems". The NPPF explains that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

A sequential, risk-based approach to the location of development is outlined in the NPPF with the aim to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

- applying the Sequential Test
- if necessary, applying the Exception Test
- safeguarding land from development that is required for current and future flood management
- using opportunities offered by new development to reduce the causes and impacts of flooding
- where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

1.3 Sequential Test

The NPPF states that the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding and that a sequential approach should be used in areas known to be at risk from any form of flooding. Development types are given a "Flood Risk Vulnerability Classification" in one of the following groups:

- Essential Infrastructure – including essential transport infrastructure, essential utility infrastructure, wind turbines
- Highly Vulnerable – including police, ambulance and fire stations, command centres, basements, caravan and mobile home parks for residential use and installations requiring hazardous consent.
- More Vulnerable – including hospitals, residential institutions, dwellings, educational facilities, landfill for hazardous substances and sites used for short stay holiday lets such as camping and caravans.
- Less Vulnerable – including shops, offices, restaurants, cafes and takeaways, general industry, storage and distribution, non-residential institutions, leisure facilities, agricultural and forestry activities.
- Water-Compatible Development – including flood control infrastructure, MOD installations etc

Table 1 below define whether the development is appropriate based on the vulnerability classification and the environment agency's flood zone.

Table 1 – Flood Risk Vulnerability and Flood Zone Compatibility (extract from NPPF)

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

1.4 Climate Change

The NPPF explains that global sea level will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. It states that, in preparing a FRA, the allowances for the rates of relative sea level rise shown in Table 2 should be used as a starting point for considering flooding from the sea.

Table 2 – Recommended Contingency Allowances for Sea Level Rises

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
North west	Higher central	4.5 (158)	7.3 (219)	10 (300)	11.2 (336)	1.01
North west	Upper end	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41

The Technical Guidance to NPPF also states that when "making an assessment of the impacts of climate change on flooding from the land, rivers and sea as part of a FRA, the sensitivity ranges in Table 3 may provide an appropriate precautionary response to the uncertainty about climate change impacts on rainfall intensities, river flow, wave height and wind speed."

Table 3 – Recommended National Precautionary Sensitivity Ranges

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
North west	Upper end	20%	35%	70%
	Higher central	20%	30%	35%
	Central	15%	25%	30%

1.5 Local Policy Guidance

The NPPF sets out that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA). For this development, the relevant guidance is the Copeland Borough Council SFRA and this has been referred to in the production of this site specific FRA.

2. Site Characteristics & Development Proposal

2.1 Site Description

The Mainsgate Road premises covers an area of 2 hectares. There are 2 developed areas: these are unit 1 (Ivory Building) which is the newer of the 2 buildings, a steel framed and steel-clad building constructed originally as a stocking factory. This unit is orientated centrally on the site and is elevated above the adjacent land.

Unit 2 is the original building (Red Brick Building) on the site and is brick built. It runs adjacent to the northern boundary. A third small building is situated to the east side of the building separated by an access track.

The remainder of the site consists of infrastructure in the form of roads with the remaining laid as grass.

This commercial unit lies on the edge of the town with housing to the north and west sides. Along both the north and south boundaries are access tracks with Mainsgate Road a public highway to the west side. This road provides the site access. To the east lies open fields.

2.2 Development Proposal

It is proposed to erect a three story extension to the existing Ivory Building. The extension is to the south side of the building and measures 34.4 metres long with a width of 7.8 metres. It will include the removal of an existing external steel escape staircase and will act as a staff entrance and include ground, 1st and 2nd floor office accommodation as well as providing maintenance access to the existing roof. The roof and walls will be finished steel cladding. See Appendix B for architects plans.

2.3 Topography

The main body of the site is relatively flat with levels ranging from 6.35m AOD to 5.40m AOD. However, where the extension is to be constructed, the site falls gently from north to south. See Appendix A for the topographical survey.

2.4 Geology

Preliminary geological information has been sourced from local geology maps. A summary of this information is as follows:-

- Made Ground – no records of made ground on-site
- Superficial geology – described as raised marine deposits – sand and gravel. Superficial deposits formed up to 3 million years ago in the Quartenary Period.
- Bedrock – the solid geology comprises of the Low Furness Basal Formation – conglomerate and sandstone, interbedded. Sedimentary bedrock formed approximately 345-359 million years ago in the Carboniferous period.

3. Existing Flood Hazards

3.1 Introduction

This section considers the following sources of flood hazards:

- Tidal
- Fluvial
- Groundwater
- Drainage systems

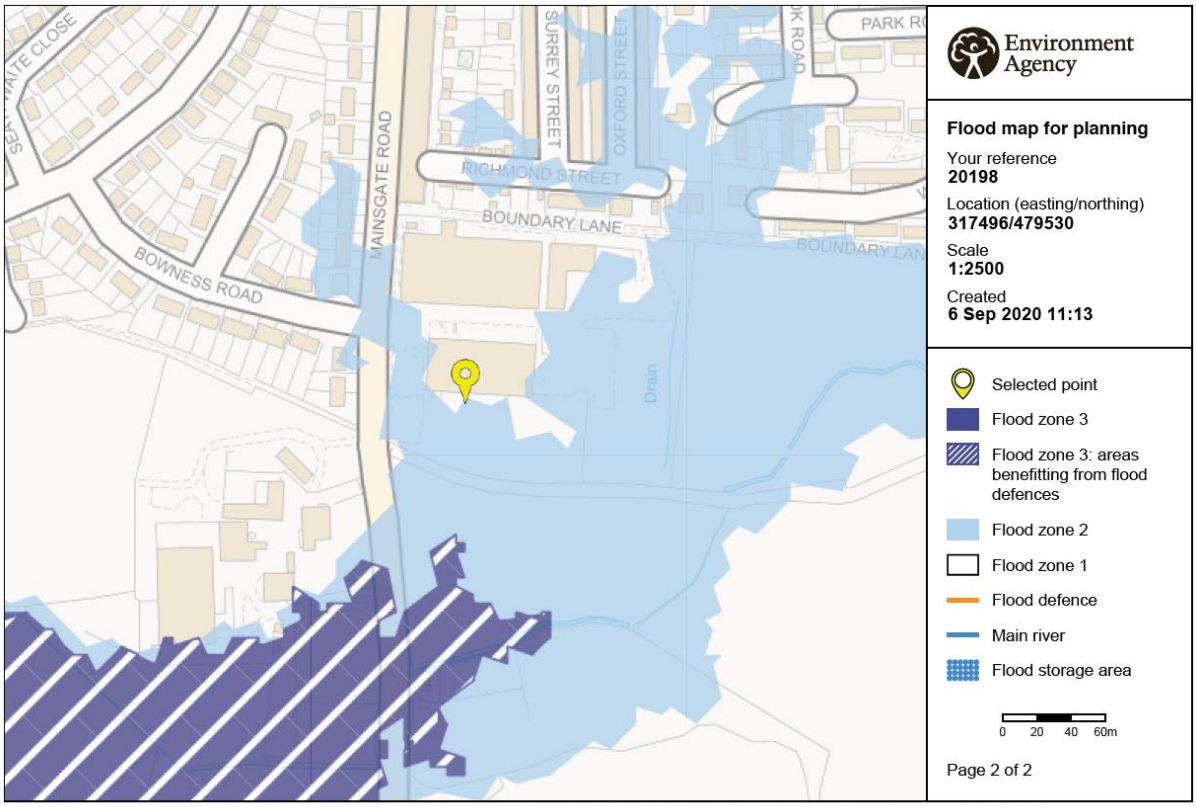
3.2 Tidal & Fluvial Flooding

The EA flood map shows the flood hazard from tidal and river sources. The latest flood information from the EA shows part of the site to be in the main flood zone 2. EA Flood Zones are defined as follows: -

- **Flood Zone 1** (low probability) is defined as land assessed as having less than a 0.1% annual probability of flooding from a river or the sea.
- **Flood Zone 2** (medium probability) is defined as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- **Flood Zone 3** (high probability) is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The Technical Guidance to NPPF splits Flood Zone 3 in to two sub-categories:

1. **Flood Zone 3a** (high probability) is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
2. **Flood Zone 3b** is defined as functional floodplain.

Map 1 – EA Flood Map for Planning (River & Sea)



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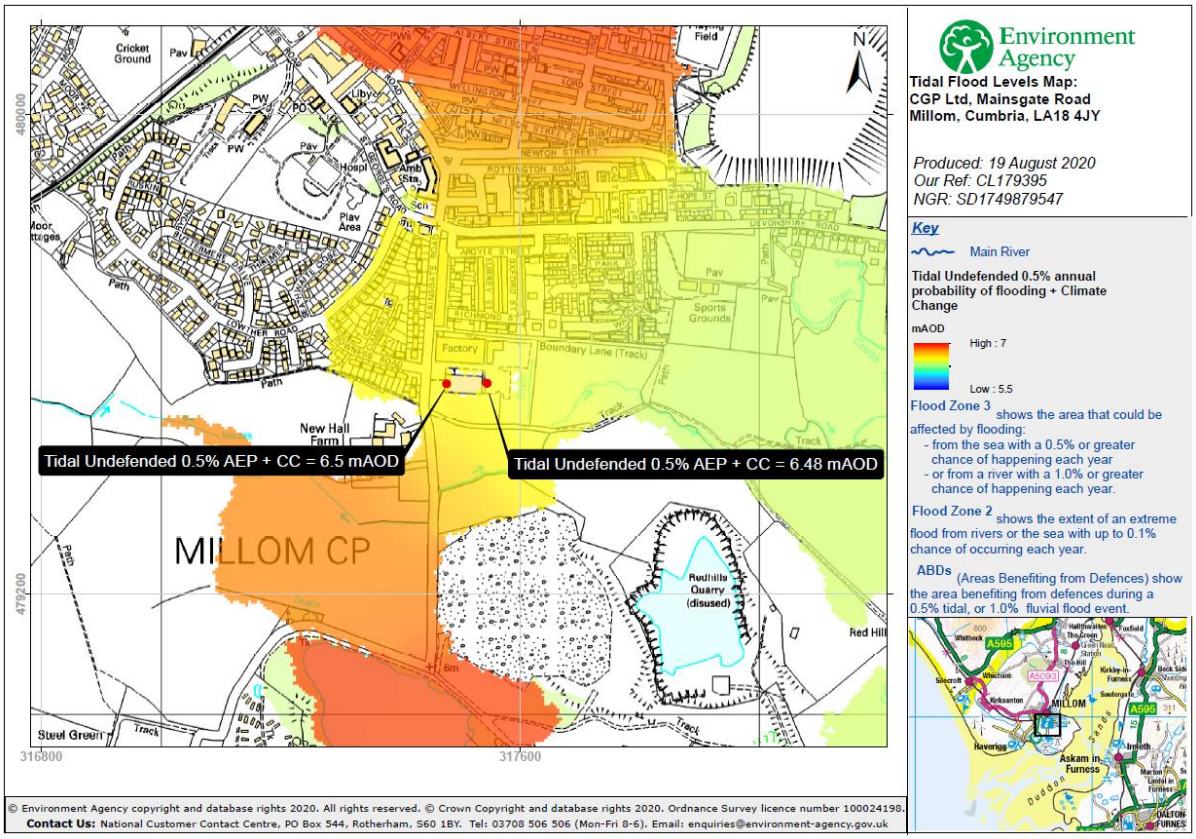
The Copeland Borough Council "Strategic Flood Risk Assessment" (SFRA) covers the main service centres of the Borough with Millom being classed as one of these. The SFRA states 'principally flood risk arises from tidal flooding, but the area has the potential to be flooded by storm events on the River Duddon and from minor watercourses such as Haverigg Pool and Salthouse Pool.

3.3 Tidal Flooding

The EA map below shows that in the 1 in 200 year plus climate change undefended event, the water level to the east and west of the existing building would be 6.48m AOD and 6.5m AOD respectively. The car park and surrounding area of the site would flood during this event. However the finished floor level of the existing building is 7.18m AOD and therefore the building would not flood.

However, there are coastal flood defences managed by Copeland Council at this location and the EA have confirmed that the defended tidal levels were not provided as they did not affect the site.

Map 2 – EA Tidal Undefended 0.5% Annual Probability of Flooding + Climate Change



3.4 Fluvial Flooding

There are three rivers in close proximity to the site. Salthouse Pool runs in a west to east direction approximately 800m to north of the site. Crook Pook runs north west to south east around 650m to the east of the site and Haverigg Pool is roughly 1.3km to the west, running north to south.

No information has been provided by the Environment Agency regarding fluvial flooding and it is assumed that there is a low risk of fluvial flooding at the application site.

3.5 Groundwater

Below is an extract from the Copeland Borough Council SFRA describing groundwater flooding:

"A limited potential for groundwater flooding exists within the Borough. In the whole of the South West Lakes Catchments, less than 10 properties are thought to be at risk."

There are no groundwater flooding incidents within Millom to our knowledge. The site is generally considered to be a low risk of groundwater flooding.

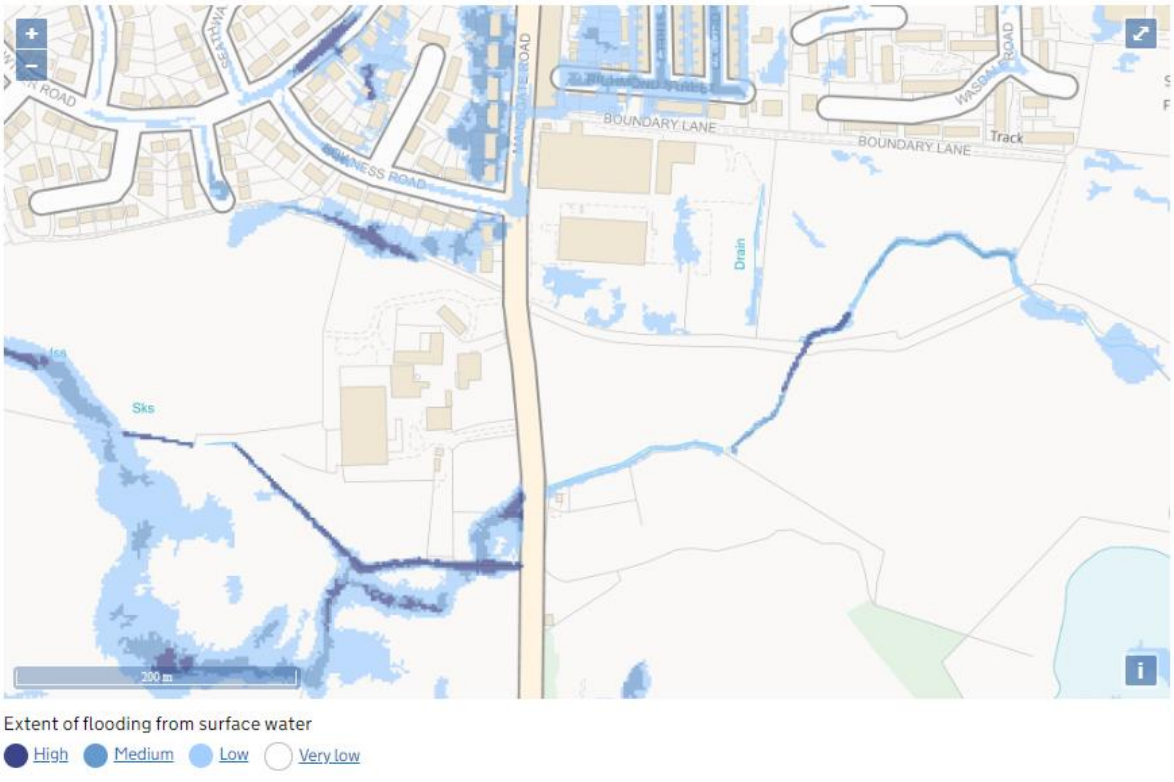
3.6 Drainage Systems & Pluvial Flooding

Surface Water (pluvial) flooding is defined as flooding caused by rainfall-generated overland flows before the runoff enters a watercourse or sewer. In such events, sewerage and drainage systems and surface watercourses may be entirely overwhelmed.

United Utilities sewer records show combined sewers to the east of the site in Mainsgate Road running south to north which connects to the sewage works to the north east of the site. There is a surface water sewer that runs parallel to the site along the northern boundary, discharging into Crook Pool. The United Utilities sewer records can be seen in Appendix C.

The flood map below shows a small area of the site to fall within the category of being at low risk of surface water flooding. This means that it has a 0.1-1% chance of flooding from surface water each year. The majority of the site falls within the very low risk category and has less than a 0.1% annual risk of surface water flooding.

Map 3 – EA – Extent of Surface Water Flooding



There have been two major incidents of flooding in Millom in recent years, one on 30th September 2017 and the other 20th July 2019. Cumbria County Council (CCC) produced a Millom and Haverigg Flood Investigation Report (FIR) relating to the event of 30th September 2017, this has been used to

facilitate this flood risk appraisal. Information regarding the July 2019 flooding has been sourced from CCC as the Lead Local Flood Authority, internet articles and local newspapers.

The CCC FIR states 'it was identified that the cause of the flooding was due to the intense rainfall event overwhelming the drainage assets, however, in some locations it may have been compounded by faults on some of the drainage systems. Work has already begun to repair identified faults'.

The FIR identified several issues such as blockage to the watercourse on Mainsgate Road, damaged highway drainage in several locations (some of which have been repaired) and potentially not enough capacity in the network. It also requested reviews of the network capacity, along with the access crossings to Crook pool and potentially splitting foul and surface water in certain locations.

External flooding on Mainsgate Road affected 3 properties, with 14 properties encountering internal flooding. It was reported that surface water often collects on the highway at 1 & 3 Bowness Road during heavy rainfall, partly due to the issues stated above. There are several properties with a finished floor level below the highway level at this location which will also have an impact.

The flooding incident on 20th July 2019 occurred when persistent rainfall was followed by intensive rainfall with 40-50mm of rainfall in 30 minutes. Eighteen properties encountered either internal or external flooding. The combined drainage network in the area surcharged and surface water was unable to drain as it would under normal conditions.

The Lead Local Flood Authority confirmed that there was 80mm of external flooding on Mainsgate Road during the incident in 2019 and that there were six properties that encountered external flooding to this extent. It is our understanding that the flooding from 2017 and 2019 occurred due to intense rainfall which overwhelmed the drainage networks. The networks affected were mainly combined sewers, however the application site will be separate surface water and foul drainage.

4. Proposed Development

4.1 Introduction

As detailed in section 3 of this report the following flood hazards need to be considered in the development of this site: -

Flood Hazard	Mitigation for Impact on Development
Tidal (Flood Zone 2)	Sequential Test
Fluvial (Flood Zone 2)	Sequential Test
Groundwater	N/A
Surface Water	Control discharge rates from proposed development

4.2 Sequential Test

As previously discussed the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding.

Part of the site falls within flood zone 2, the proposed extension falls within flood zone 1 and the vulnerability classification is “less vulnerable” and as a result the exception test does not need to be applied meaning the development is deemed appropriate.

4.3 Proposed Site Levels & Depths

The existing building has a finished floor level of 7.18m AOD and it is proposed to install the extension finished floor level to match this. As a result, the finished floor level will be 0.68m above the level of the modelled 200 year plus climate change undefended tidal event as provided by the EA.

This level is also approximately 0.80m -1.0m+ higher than the adjacent highway of Mainsgate Road. This would mean that flood events such as the one in 2019 where there was 80mm of external flooding, would not affect the proposed extension.

4.4 Proposed Drainage Strategy

Any proposed drainage scheme should minimize the rate of runoff to match the existing runoff from the site. This will ensure that the risk of surface water flooding will not be passed on to others and at the very least the status quo will be maintained.

We would suggest that percolation tests are undertaken during the works and that a soakaway system is utilized if possible in agreement with Building Control.

4.5 Emergency Planning

The proposed development is located within a key service centre within Copeland. The Borough Council and Cumbria County Council have emergency plans to co-ordinate evacuation of residents, however floods can occur quickly and areas at highest risk will be dealt with first.

It is unlikely that the building will flood given its proposed finished floor level relative to the highway level and flood information provided by the EA and LLFA, although the application site may encounter some flooding in extreme events. However, if a flood were to occur with people unable to evacuate beforehand, they should take refuge at first floor level which will keep them safe until emergency services arrive.

Environment Agency flood warnings provide the earliest warning for residents and businesses. These should be monitored during extreme weather conditions. If a warning is issued that is expected to affect the site and may hinder employees from travelling home, they should be sent home to avoid being caught in the flood event.

5. Summary

Part of the site is in flood risk zone 2 however the proposed extension will be located in flood zone 1 and based on NPPF guidance the sequential test has been applied. The vulnerability classification of the proposal suggests that development is suitable for this site.

The potential for flooding at this site is low. Tidal flooding is deemed as the main risk to the site. To mitigate against the possibility of flooding to the extension it is proposed to install the finished floor level to match the existing building at 7.18m AOD. This will mean the finished floor level is approximately 680mm above the EA modelled level 200 year tidal event with an allowance for climate change.

Any proposed drainage should minimize the rate of runoff to match the existing runoff from the site. This will ensure that the risk of surface water flooding will not be passed on to others.